

SD
431.5

Forestry Library

COPY 2

A23

088

1964

UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

Region 9

Plan 13

Ottawa Nat. For. Mich.

TIMBER MANAGEMENT PLAN

Ottawa National Forest

July 1, 1963 - June 30, 1973

Region 9

U. S. Department of Agriculture

Forest Service



TIMBER MANAGEMENT
PLAN

OTTAWA
NATIONAL FOREST

F. Y. 1964 through F.Y. 1973

Region 9
U. S. Department of Agriculture
Forest Service

TIMBER MANAGEMENT PLAN

Ottawa National Forest
F.Y. 1964-1973

Submitted : William L. Kukbusch 12-3-63
T.M. Ass't. Date

Approved : John O. Wrenham 12-3-63
Forest Supervisor Date

Approved : Louis C. Hermel 12-18-63
Deputy Regional Forester Date

Approved : A. W. Greeley 9/19/64
Acting Chief, F.S. Date

APM *B H Payne*

Reviewed : Workman 12/17/63
R-9 Timber Management Date

Reviewed : H. O. Nipon 12-12-63
R-9, M.U. Coordinator Date

F O R E W O R D

This management plan was prepared by the staff of the Ottawa National Forest with technical assistance from the Regional Forester's timber management staff. It was developed within the management direction and coordination requirements in the Regional Multiple-Use Guide and the Ranger District Multiple-Use Plans.

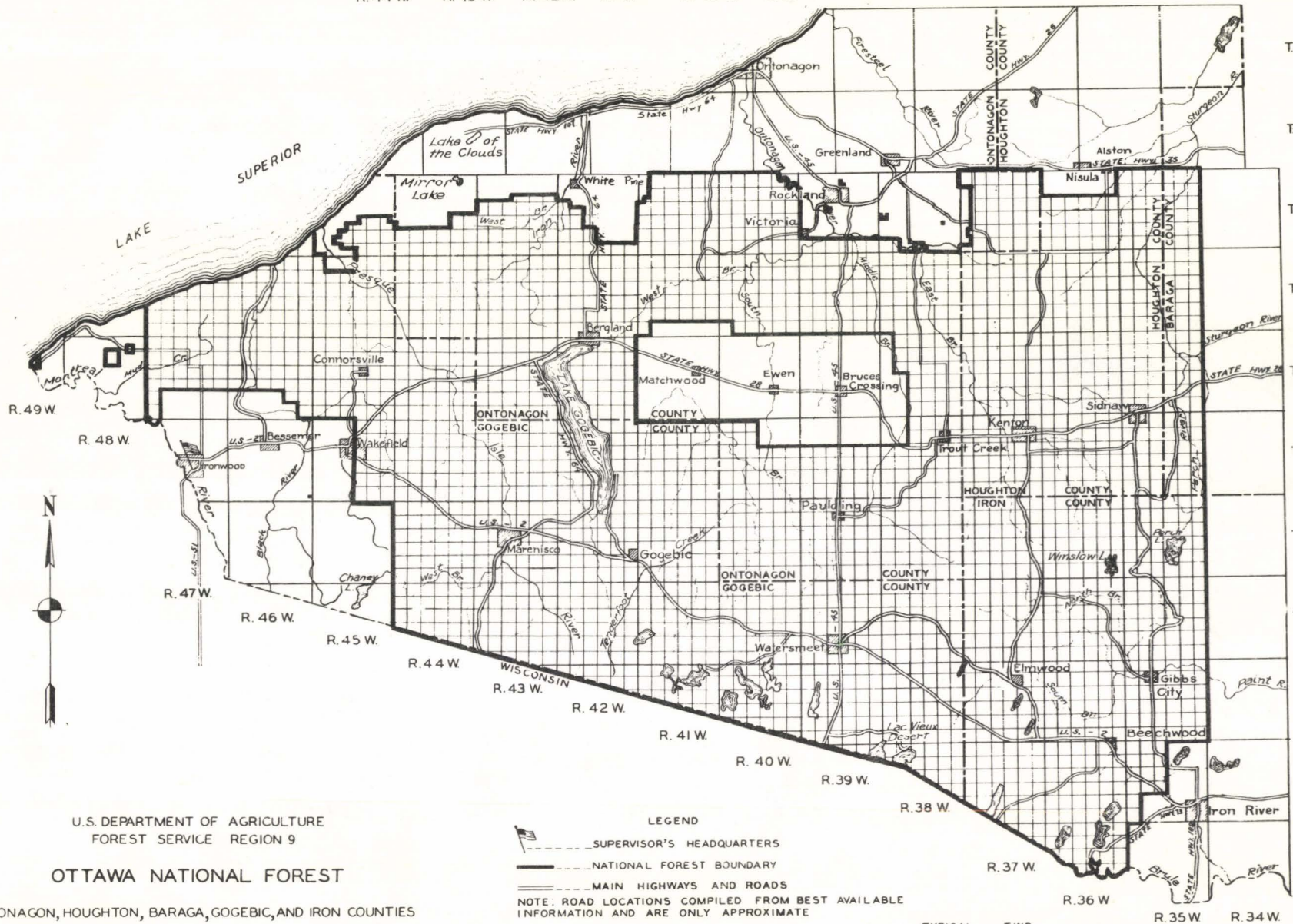
The field inventory was made between January, 1961 and March, 1962. Modified infra-red aerial photographs at a scale of 15,840 taken in the summer of 1960 were used for mapping and area data collection.

TABLE OF CONTENTS

	<u>Page No.</u>
FOREST MAP	
SUMMARY	
BACKGROUND	
Location and History	1
Physiography	1
Economy and Markets	2
FOREST CONDITIONS AND CHANGES	
Area and Timber Size Classification	3
Timber Types	4
Age Class Distribution	5
Site	6
Area Condition Class	7
Deer Browsing	8
Timber Volume	9
Changes in Growing Stock Volume	10
Growth	13
PAST TIMBER MANAGEMENT	
Timber Harvest	14
Planting	16
Timber Stand Improvement	16
Roads	16
Protection	16
PLAN OF ACTION	
Management Objectives	18
Silviculture	18
Regeneration	18
Timber Stand Improvement	20
Insect and Disease Control	20
Animal Damage	22
Coordination	22
Access Roads	22
Property Lines	23
Allowable Cut	23
STATISTICAL SUMMARY	31
CURRENT ACTION PLAN	32
APPENDIX A - Detailed Tables	33
APPENDIX B - Inventory Instructions	Separate
APPENDIX C - IBM Summaries	Separate
APPENDIX D - Action Plan	Separate
Cultural Work	
Cutting Budget	
Road Development Schedule	

R. 44 W. R. 43 W. R. 42 W. R. 41 R. 40 W. R. 39 W. R. 38 W. R. 37 W. R. 36 W. R. 35 W. R. 34 W

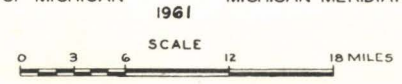
T. 52 N.
T. 51 N.
T. 50 N.
T. 49 N.
T. 48 N.
T. 47 N.
T. 46 N.
T. 45 N.
T. 44 N.
T. 43 N.
T. 42 N.



U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE REGION 9

OTTAWA NATIONAL FOREST

ONTONAGON, HOUGHTON, BARAGA, GOGEBIC, AND IRON COUNTIES
STATE OF MICHIGAN



LEGEND

- SUPERVISOR'S HEADQUARTERS
- NATIONAL FOREST BOUNDARY
- MAIN HIGHWAYS AND ROADS

NOTE: ROAD LOCATIONS COMPILED FROM BEST AVAILABLE INFORMATION AND ARE ONLY APPROXIMATE

TYPICAL TWP

6	5	4	3	2	1
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24
25	26	27	28	29	30
31	32	33	34	35	36

FOR INFORMATION CONTACT:
FOREST SUPERVISOR
U.S. FOREST SERVICE
IRONWOOD, MICHIGAN

FOREST SUMMARY

AREA (Acres)

Regulated Commercial Forest:		
Timbered	791,100	
Nontimbered	<u>36,100</u>	
Total		827,200
Unregulated Commercial Forest:		4,100
Noncommercial Forest:		
Nonproductive		8,100
Nonforest		25,500
Total Land Area		864,900 ^{1/}

NET VOLUME

Sawlog Material (MBM Scrib. Rule):		
Conifers	197,700	
Hardwoods	<u>523,500</u>	
Total		721,200
Cordwood Material (M Cu. Ft.):		
Conifers	172,800	
Hardwoods	<u>379,200</u>	
Total		552,000
Growing Stock (M Cu. Ft.):		
Conifers	204,400	
Hardwoods	<u>463,000</u>	
Total		667,400

PERIODIC ANNUAL NET GROWTH

Sawlog Material (MBM Scrib. Rule):		
Conifers	6,800	
Hardwoods	<u>24,600</u>	
Total		31,400
Growing Stock (M Cu. Ft.):		
Conifers	9,800	
Hardwoods	<u>24,000</u>	
Total		33,800

^{1/} Includes 2,500 acres in process of acquisition.

ANNUAL ALLOWABLE CUT AREA

Regeneration	7,970 acres
Intermediate	<u>11,120 acres</u>
Total	19,090 acres

ANNUAL ALLOWABLE CUT VOLUME

Sawlog Material: (Scribner Rule)

Conifers	2,870 MBM
Hardwoods	<u>6,850 MBM</u>
Total	9,720 MBM

Cordwood Material:

Conifers	(33,100 cords)	2,650 M Cu. Ft.
Hardwoods	<u>(103,110 cords)</u>	<u>8,250 M Cu. Ft.</u>
Total	(136,210 cords)	10,900 M Cu. Ft.

Growing Stock:

Conifers	(38,840 cords)	3,110 M Cu. Ft.
Hardwoods	<u>(116,810 cords)</u>	<u>9,340 M Cu. Ft.</u>
Total	(155,650 cords)	12,450 M Cu. Ft.

DISTRICT SUMMARY

District	: Com.	:	:	:	: Allowable Cut Allocation	
	: Forest	: Growing	: Annual	: Total	: Regen-	: Inter-
	: Land	: Stock	: Growth	: Volume	: eration	: mediate
	<u>Acres</u>	<u>Cords</u>	<u>Cords</u>	<u>Cords</u>	<u>Acres</u>	<u>Acres</u>
Bergland	107,329	1,066,000	55,600	18,920	1,040	1,210
Bessemer	149,949	1,394,000	75,800	21,330	1,290	1,320
Iron River	126,424	1,383,000	58,900	31,550	1,440	2,050
Kenton	167,635	1,638,000	83,300	31,240	1,680	2,120
Ontonagon	133,157	1,512,000	76,500	31,110	1,310	2,400
Watersmeet	<u>142,702</u>	<u>1,350,000</u>	<u>72,200</u>	<u>21,500</u>	<u>1,210</u>	<u>2,020</u>
Total	827,196	8,343,000	422,300	155,650	7,970	11,120

OTTAWA MANAGEMENT PLAN

Background

Location and History

The Ottawa National Forest is located in the western end of the Upper Peninsula of Michigan. As of June 30, 1962 it encompassed an area of 1,505,334 acres of which 862,405 acres were under National Forest ownership. An additional 2,500 acres are approved for acquisition.

The Ottawa Purchase Unit was approved by the National Forest Reservation Commission in 1928. In 1931, the purchase unit was proclaimed the Ottawa National Forest by President Herbert Hoover. Since 1931, two extensions and an additional purchase unit have been added to the original purchase unit to make up the present Forest.

The first intensive inventory of the Forest was made in 1948 and 1949 and a timber management plan was formulated for each of 6 working circles to prescribe timber management practices and goals. These were applicable until revised in this plan. Copies of that plan are on file at the Ranger's and Supervisor's Office and may be referred to for additional historical and background information.

Physiography

The topography ranges from sand plains on the east end of the Forest to rugged hills in the northwestern part. The elevation varies from 600 feet above sea level at Lake Superior to 2,023 feet in the Porcupine Mountains.

Numerous Lakes are present in the southern part of the Forest, while in the northern part many streams flow rapidly into Lake Superior through deep, narrow valleys.

Soils are primarily of glacial origin. They range from pure sand to clay. Peat and muck are formed in depressions formerly occupied by water.

Although weather records show that frost has occurred every week throughout the summer, the average frost-free growing season is about 80 days. The mean summer temperature is about 60 degrees and the mean annual *winter* temperature is only about 40 degrees. Mean annual precipitation is about 32 inches with about 14 inches falling during the growing season. Generally it is well distributed.

The ameliorative influence of Lake Superior reaches inland for 5 to 15 miles and accounts for a slightly longer growing season and heavier rainfall which generally explains the somewhat better timber growth on the lakeshore land.

Economy and Markets

The economy of the area is dependent to a large extent upon the forest resources of timber and recreation. Mining, once the primary industry in this area, no longer plays the major role in the local economy.

The demand for hardwood sawtimber in this area is very high due to the numerous medium and large sawmills on or adjacent to the Forest. Since the demand is greater than the present supply of sawtimber, the markets should continue to be excellent. Hardwood veneer logs are also in very high demand because of the close proximity of several veneer mills. From all indications the veneer market situation will continue to be very good.

The markets for pulpwood, on the other hand, are presently limited. Two pulpmills are located near the Forest, but their consumption of pulpwood is rather limited. Most of the pulpmills which could be expected to use wood from this Forest are located in Wisconsin. The Forest has good railroad and highway connections with these mills. However, the transportation costs create a marketing problem for much of the material that is now available.

Pine and spruce pulpwood demand is reasonably good. Aspen, paper birch and balsam fir have periodic highs and lows in demand, but generally they only rate fair as far as markets are concerned. Emphasis should be placed on the marketing of this material. Dense hardwood pulpwood markets are somewhat limited at the present time. Only one mill has taken this material in any sizable quantities in the past. Again, transportation costs are a limiting factor. Markets are improving with the conversion of several mills to hardwood pulpwood. Since the quantity of material that is available on the Forest is high, the demand for dense hardwood pulpwood should improve.

In brief, the markets for sawtimber are excellent and the demand should continue to be high. The markets for pulpwood, on the other hand, are generally only fair and a great deal of work is needed to improve this situation.

Forest Conditions and Changes

Area and Timber Size Classification

Of the 864,900 acres of National Forest land, 827,200 acres or 96% is commercial forest land - that is - land which is producing or capable of producing crops of industrial wood and is not withdrawn from timber utilization. Four percent of the commercial forest land or 36,100 acres is presently less than 10% stocked with commercial tree species (App., Table 1).

Because of some differences in methods of stand classification, acquisition and land exchange, etc., absolute comparisons between inventories are difficult to make. However, it is possible to glean some trends from the data. The most noteworthy is the increase in poletimber stands (Figure 1). The large increase in poletimber area occurred mostly in the northern hardwoods and aspen types. In 1949 only 34 percent of the total area of these two types was in poletimber stands - today, pole stands occupy 57 percent. Sawtimber stands increased from 124,400 acres in 1949 to the present area of 205,200 acres.

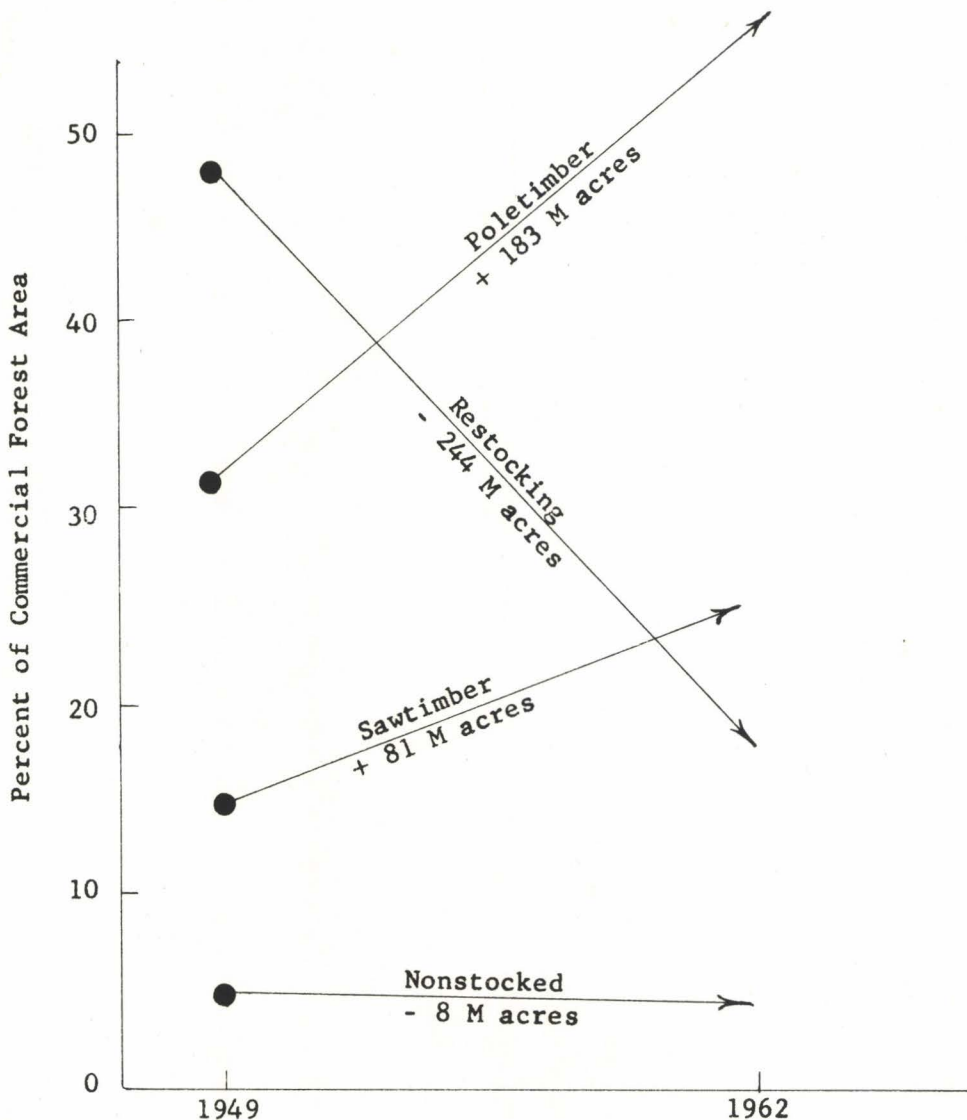


Figure 1. Changes in Forest Area Between 1949 and 1962 by Stand-Size Class.

Timber Types

The northern hardwoods and aspen forest types dominate the Forest (Appendix, Table 1). Together they occupy almost 70 percent of the commercial forest land. All hardwood types combined make up 73 percent. The swamp conifer types of cedar, black spruce and tamarack account for about one-third of the softwood type area. The pine types occupy slightly less area and are followed by the spruce-fir and hemlock, in that order.

Timber type area has remained relatively stable between 1949 and 1962 with the most significant changes occurring in the pine types (Figure 2). In 1949 pine occupied 69,200 acres, and now occupies only 57,500 acres. Much of the loss is due to the increase of other species - mostly hardwoods, to the extent that they now make up most of the basal area. Improvement cuts in these stands will gradually convert them back to the pine type.

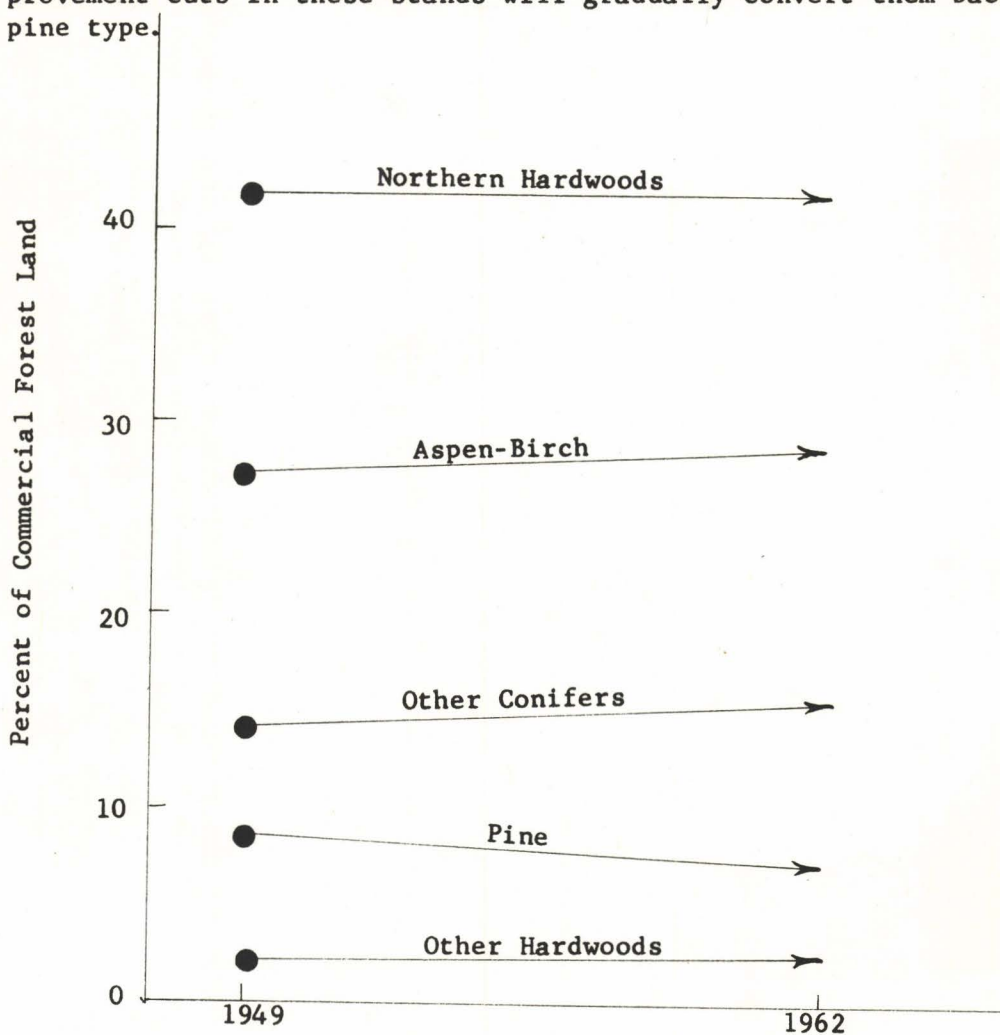


Figure 2. Changes in Forest Areas Between 1949 And 1962 by Forest Types.

Age Class Distribution

Over one-half of the commercial forest land is stocked with stands of uneven-aged timber (Appendix, Table 2). The remainder is largely concentrated in the young age classes (Table 1).

Table 1. Area of Timbered Commercial Forest
Land by Age Classes - 1962.

Age Class - Years	Percent
0 - 25	8
26 - 35	16
36 - 45	12
46 - 55	6
56 - 65	3
66+	1
Uneven-aged	54

Very little overmature timber is present. What little exists is mostly in the aspen type. This type also has almost three-fourths of its area in the 26-45 year age group, the most productive stage in the rotation in terms of volume production. Sixty-five percent of the pine type is composed of stands under 35 years of age.

Site

Generally, sites are average or above average for most types (Appendix, Table 3). Some poor sites exist where stand conversion is desirable; but generally, the species are fairly well suited for the particular sites they occupy. The aspen and paper birch types, for instance, have over 95% of their area in medium or better sites (Table 2).

Table 2. Area of Timbered Commercial Forest Land
by Forest Type and Site Classes.

Forest Type	Site Class		
	All	Poor	Medium & Good
- Acres -			
White Pine	11,100	600	10,500
Red Pine	21,000	200	20,800
Jack Pine	25,400	8,800	16,600
Spruce-fir	46,300	5,300	41,000
Hemlock	26,700		26,700
Swamp Conifers	56,900	1,400	55,500
Northern Hardwoods	348,400	3,200	345,200
Aspen-Paper Birch	237,300	11,500	225,800
Other Hardwoods	<u>18,000</u>	<u>4,500</u>	<u>13,500</u>
Total	791,100	35,500	755,600

Area Condition Class

Area condition class refers to the condition of the commercial forest with respect to current productivity. Stocking and growing stock quality determine area condition. Five area condition classes were recognized. These are:

<u>Area Condition Class</u>	<u>Definition</u>
1	Areas 70% or more stocked with desirable trees.*
2	Areas 40-70% stocked with desirable trees and with <u>less than</u> 30% of the area controlled by inhibiting vegetation or surface conditions that will prevent occupancy by desirable trees.
3	Areas 40-70% stocked with desirable trees and with <u>more than</u> 30% of the area controlled by inhibiting vegetation or surface conditions that will prevent occupancy by desirable trees.
4	Areas less than 40% stocked with desirable trees and with adequate seed source and seedbed favorable to natural restocking.
5	Areas less than 40% stocked with desirable trees and with inadequate seed source and/or seedbed unfavorable to natural regeneration.

On the whole about 85 percent of the commercial forest land is adequately stocked with desirable trees (area condition classes 1, 2, and 3). Only 8 percent of the commercial forest land or 68,300 acres is classed as area condition class 5 indicating that action is needed to make these acres produce quality wood (Table 3).

* Desirable tree - A healthy dominant or codominant tree with a crown more than 1/3 filled with foliage of good color and normal size, with no apparent physical weaknesses, pathogens, or insects present which are likely to kill or seriously deteriorate the tree within 10 years; having less than 10 percent defect; capable of yielding now or prospectively at least one grade 1 or 2 sawlog or two 100-inch standard quality pulp sticks and be 3" d.b.h. or larger. If smaller it also must be of a species suitable for the type and site.

Table 3. Area of Commercial Forest Land by Forest Type and Area Condition Class (Acres).

Forest Type	: Total : : Area :	Area Condition Class				
		1	2	3	4	5
White & Red Pine	32,100	10,600	14,200	200	4,700	2,400
Jack Pine	25,400	12,500	9,800	1,000	1,000	1,100
Spruce-fir	46,300	14,500	23,300	1,300	3,900	3,300
Swamp Conifers	56,900	13,500	32,000	3,500	2,900	5,000
No. Hdws.-Hemlock	375,100	165,900	185,000	2,400	17,300	4,500
Aspen-Paper Birch	237,300	71,100	122,100	5,200	21,900	17,000
Other Hardwoods	18,000	7,500	9,000	300	700	500
Nonstocked	<u>36,100</u>	_____	_____	_____	<u>1,600</u>	<u>34,500</u>
Total	827,200	295,600	395,400	13,900	54,000	68,300

Deer Browsing

A survey of deer browsing effects was carried out concurrent with the timber management survey. At each inventory sample point an additional mil-acre plot was taken to assess deer browsing on reproduction (stems less than 0.6" d.b.h.). The results of the survey are shown in Table 4.

Table 4. Area & Percent of Timbered Commercial Forest Land by Deer Browse Classes.

Deer Browse Class	Area	
	Acres	Percent
No stems of potential good growing stock over 1 foot in height, and below 0.6" d.b.h. are present or if present are not needed.	721,900	91.4
The best tree* on the plot shows no evidence of present or past browsing on the main stem.	31,200	3.9
The best tree* on the plot shows no evidence of present or past browsing but a more desirable species is present which has been browsed.	3,200	0.4

* Must be good growing stock.

Deer Browse Class	Area	
	Acres	Percent
The best tree** is browsed and has 1-5 old browsed terminals.	27,900	3.5
The best tree** is browsed and has 1-5 old browsed terminals but a more desirable species is present which is more seriously browsed.	1,000	0.1
The best tree** is browsed and has more than 5 old browsed terminals.	5,900	0.7

Of particular significance is the nearly 5% or 38,000 acres on which significant deer browsing has occurred in the reproduction. Most of the browsing has occurred in the northern hardwood and aspen types. At any one time a relatively small area is in such a condition where reproduction is needed and is present. This area was estimated to be 69,200 acres. Browsing occurred on desirable stems on 55% of this area. Severe browsing occurred on 9% of this area.

Timber Volume

The Ottawa National Forest contains almost 8½ million cords of growing stock of which 721 million board feet (Scribner) is in sawlog material and 6,900,600 cords is in cordwood material (Table 5). An additional 138,000 cords of wood, some of which is suitable for pulpwood, is contained in cull trees.

Net volume of growing stock and sawtimber is fairly well distributed among the districts. The Kenton District has the most growing stock and sawtimber while Bergland contains the least. (Appendix, Tables 5 & 6.) However, average per acre volume of growing stock is highest on the Ontonagon District (11.53 cords) and lowest on the Bessemer District (9.82 cords). Sawlog average volume per acre is highest on the Iron River District (1,070 bd. ft.) and lowest on the Bessemer (741 bd. ft.).

Sugar maple, which has more volume than any other species, makes up almost one-fourth of the total growing stock and over one-third of the sawlog volume (Appendix, Table 4). Aspen is second in rank with about one-fifth of the total volume.

Hardwood species account for 69 percent of the growing stock volume and 63 percent of the sawlog volume.

** A tree which would have been good growing stock had it not been browsed.

Table 5. Net Timber Volume on Timbered Commercial Forest
Land by Species Groups and Kind of Material.

Species Groups	Growing Stock M Cords	Cordwood Material M Cords	Sawlog Material MMBM
White & Red Pine	344	190	77
Jack Pine, Fir & Spruce	1,163	1,163	
Other Softwoods	1,049	807	121
Northern Hardwoods <u>1/</u>	2,747	1,907	420
Aspen	1,685	1,685	
Other Hardwoods	<u>1,355</u>	<u>1,149</u>	<u>103</u>
Total	8,343	6,901	721

Changes in Growing Stock Volume

In the 13-year period between surveys growing stock volume increased 2 million cords or 32 percent over the 1949 volume of 6,300,000 cords (Table 6 & Figure 3). Only 2 species, hemlock and yellow birch, showed a decline in growing stock volume.

The volume of sugar maple increased 13% over the 13-year period. Total hardwood and softwood volumes rose 35% and 27% respectively. The softwood pulp species of jack pine, spruce and balsam fir increased 76% which amounts to an average annual increase of over 6% over and above harvest volume.

Comparisons of sawlog volume between surveys were not made because of differences in standards, utilization practices, etc.

1/ Sugar maple, yellow birch & basswood.

Table 6. Growing Stock Volume - 1949 & 1962 and
Change by Species or Species Groups.

Species	: Volume : 1949 <u>1/</u> M Cords	: Volume : 1962 M Cords	: Total : Change M Cords	: Annual : Change %
White & Red Pine	229	344	+ 115	3.9
Spruce & Balsam Fir	627	1,038	+ 411	5.0
Jack Pine	35	125	+ 90	19.8
Hemlock	750	653	- 97	-0.1
Tamarack & Cedar	<u>375</u>	<u>396</u>	<u>+ 21</u>	<u>0.4</u>
All Softwoods	2,016	2,556	+ 540	2.1
Sugar Maple	1,474	1,901	+ 427	2.2
Red Maple	339	508	+ 169	3.8
Yellow Birch	579	565	- 14	
Basswood	168	281	+ 113	5.2
Elm & Ash	332	513	+ 181	4.2
Aspen	1,135	1,685	+ 550	3.7
Paper Birch	161	177	+ 16	0.8
Other Hardwoods	<u>93</u>	<u>157</u>	<u>+ 64</u>	<u>5.3</u>
All Hardwoods	4,281	5,787	+1,506	2.7
All Species	6,297	8,343	+2,046	2.5

1/ Volumes adjusted to conform to 1962 standards.

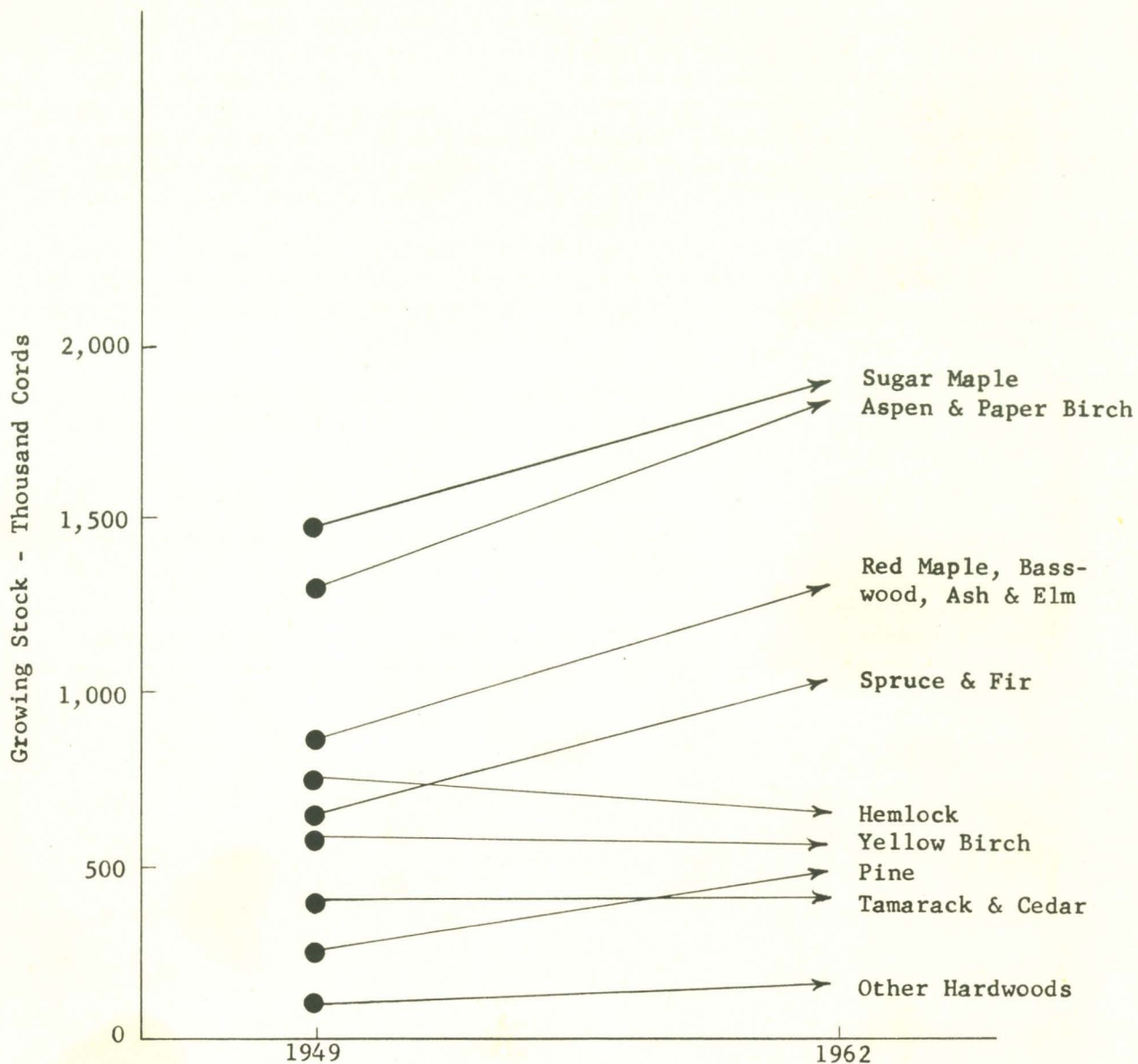


Figure 3. Growing Stock Changes Between 1949 and 1962 by Species or Species Groups.

Growth

Total net periodic annual growth of growing stock is estimated to be 422,300 cords. This includes 31,400 MBM of sawlogs and 359,500 cords of cordwood material (Table 7 & App., Tables 7 & 8). This is equivalent to 5.1% of the total growing stock volume and 4.4% of the sawlog volume. On a per acre basis it amounts to 0.5 cords of growing stock and 40 board feet of sawlogs.

Much of the growth is occurring as ingrowth, that is, on trees which are unmerchantable now but will move into the merchantable class during the 10-year period.

The growth estimate considers only normal mortality in stands. It does not consider catastrophic losses occurring to individual stands on the Forest from windstorms, fire, insects, or disease.

Table 7. Net Periodic Annual Growth of Growing Stock & Sawlog Material on Timbered Commercial Forest Land by Species Groups - 1962.

Species	Growing Stock	Sawlog Material
	<u>Cords</u>	<u>MBM</u>
White & Red Pine	20,600	4,300
Jack Pine, Fir & Spruce	81,400	
Other Softwoods	21,000	2,500
Northern Hardwoods ^{1/}	122,100	15,500
Aspen	106,600	
Other Hardwoods	<u>70,600</u>	<u>9,100</u>
Total	422,300	31,400

^{1/} Sugar maple, basswood and yellow birch.

Past Timber Management

Timber Harvest

The allowable cut area for the previous plan period was 15,235 acres per year. Estimated allowable cut volume was 11,383,000 board feet of saw-timber and cedar products and 61,325 cords of boxbolts and pulpwood or a total volume of 84,100 cords. The total actual cut of regulated volume was close to the allowable in recent years (Table 8, Figure 4). The total actual cut for the 15-year period from 1949 through 1963 amounted to over 1 million cords. For the past 5 years sawlogs have accounted for 14% of the cut with very small year-to-year fluctuations.

Table 8. Actual Cut Volume by Fiscal Year.

<u>Fiscal</u>	<u>:</u>	<u>Regulated</u>	<u>:</u>	<u>Unregulated Volume</u>
<u>Year</u>	<u>:</u>	<u>Volume</u>	<u>:</u>	<u>(Chemical Wood)</u>
				<u>Thousand Cords</u>
1949		37.7		
1950		39.6		
1951		63.1		
1952		60.4		
1953		60.6		
1954		62.3		
1955		80.7		
1956		77.4		
1957		96.1		
1958		82.3		6.5
1959		72.5		8.9
1960		78.0		15.2
1961		90.3		13.3
1962		81.3		9.5
1963		<u>96.1</u>		<u> </u>
Total		1,078.4		53.4

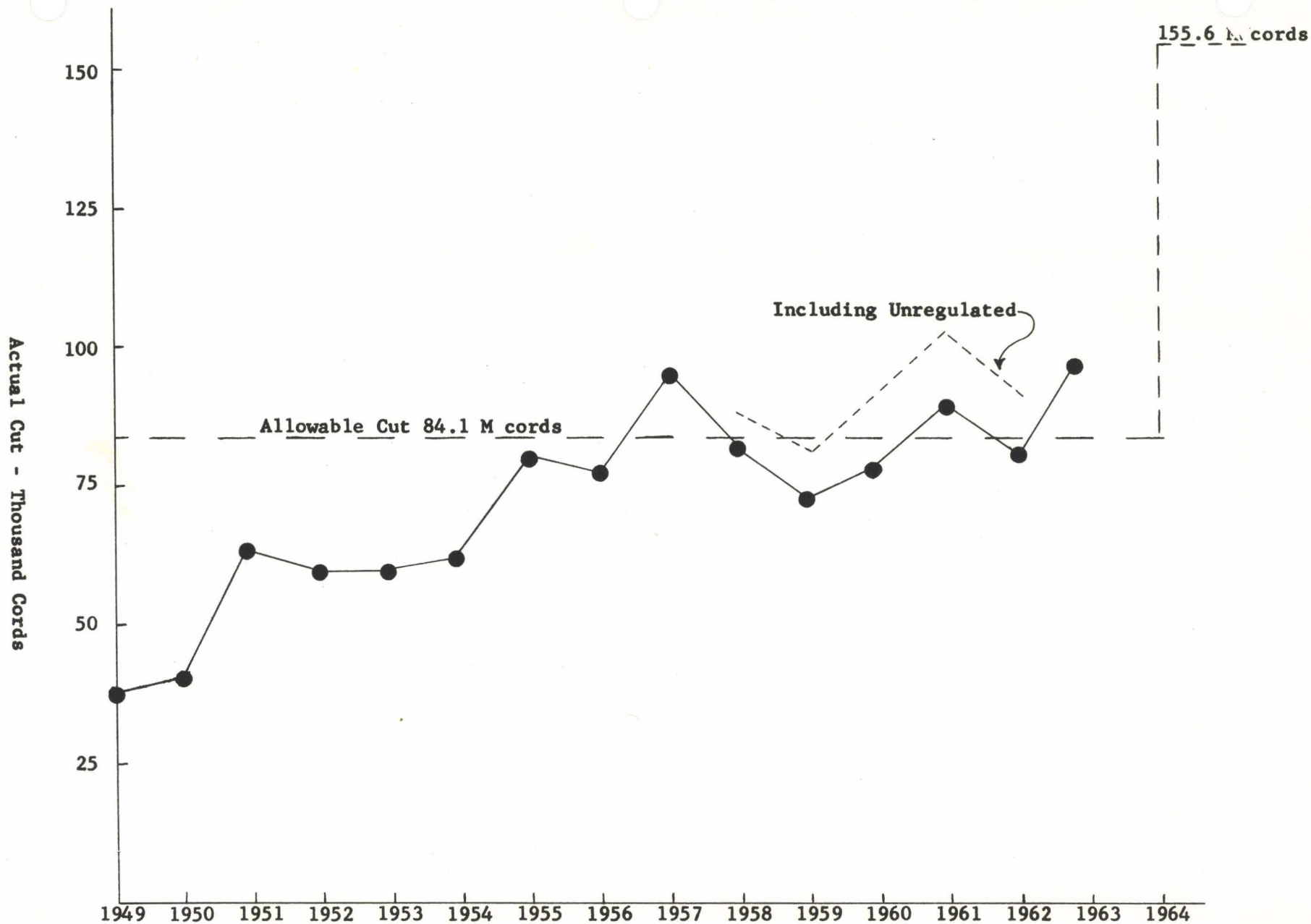


Figure 4. Actual & Allowable Cut by Years - 1949 through 1963.

Planting

As of July 1, 1963, there were 72,369 acres of successful plantations. Most of the 10,000 acres planted during the previous plan period were to red pine. Most of the jack pine plantations were established before 1950. There has been a gradual increase in white spruce planting in the last few years.

About 25,000 acres of plantations are 10 percent or more stocked with other species. Many of these plantations will require overhead release or weeding.

Timber Stand Improvement

As of July 1, 1962, there were 95,929 acres that had been worked. Of the 64,812 acres worked in the previous plan period 23,000 acres were plantation release, 41,200 acres were natural stand release and weeding and 612 acres were pruned. A total of 3,500 acres of plantation release were accomplished by timber sale and 19,500 acres were completed with P&M and K-V funds.

There has been a gradual increase in the plantation release acreage completed as well as the natural stand release and weeding acreage but a decline in acres pruned.

During the period November 1, 1962, to July 1, 1963, there were 9,670 acres of hardwood crop tree thinning and cull tree removal, 3,197 acres of plantation release and 1,955 acres of pruning accomplished with accelerated public works funds.

Roads

The total planned primary road system on the Forest is 1,900 miles. As of July 1, 1962, a total of 1,509 miles have been completed.

Protection

A complete picture of the fire protection trend can be obtained from an analysis of the district fire plans.

The jack pine budworm (Choristoneura pinus) was a serious insect pest during the past plan period. It has, however, declined to a low endemic level. Parasitism and cultural practices are the probable cause of the population decline.

The forest tent caterpillar (Malacosoma disstria) was also present in epidemic proportions in the early 1950's but no major outbreaks have occurred in the last few years.

The white pine weevil (Pissodes strobi) has caused considerable damage in white pine plantations. Lesser damage has occurred in red pine and white spruce.

Three other insects present in endemic proportions are the saratoga spittlebug (Aphrophora saratogensis), red headed pine sawfly (Neodiprion lecontei) and larch sawfly (Pristiphora erichsonii).

White pine blister rust (Cronartium ribicola) still remains a problem. Because of the small isolated stands of white pine few control measures were carried out other than maintenance.

Plan of Action

Management Objectives

The overall objective will be to produce the optimum quantity and quality wood consistent with other uses as provided for in the Regional Multiple-Use Guide and the Ranger District Multiple-Use Plans.

1. To insure regeneration of desirable species promptly after all regeneration cuts.
2. To reforest nonstocked commercial forest land when economically feasible and to the extent compatible with other uses.
3. To improve the stocking of desirable trees through timber sale, timber stand improvement, and regeneration measures.
4. To provide local industry with a steady supply of wood and to promote utilization of the full allowable cut.
5. To develop a permanent utilization road system.
6. To convert poor and medium site aspen to spruce-fir or red pine if medium site or better for the planted species.
7. To convert jack pine to red pine on medium and better jack pine sites after jack pine regeneration cuts.
8. To manage the northern hardwood type for high quality sawtimber.
9. To examine each compartment once during the plan period in order to determine the silvicultural needs and to meet these needs whenever possible.
10. To promote markets for pulpwood products, especially dense hardwood pulpwood in order to help the local economy and accelerate high value sawlog production for the future.

Silviculture

The methods of silviculture to be used under this plan are set forth in printed management guides for each timber type.

Regeneration

The artificial regeneration program is to reforest almost 50,000 acres during the plan period (Table 9).

Table 9. Artificial Regeneration Program by Districts.

District	: Nonstocked & Poorly : : Stocked Areas : <u>acres</u>	After Regeneration Cutting <u>acres</u>
Bergland	6,700	2,400
Bessemer	3,100	2,600
Iron River	4,400	2,800
Kenton	9,400	3,500
Ontonagon	2,400	3,200
Watersmeet	<u>6,400</u>	<u>2,500</u>
Total	32,400	17,000

Almost one-half of the 32,400 acres to be reforested is presently in upland brush or open. The poorly stocked areas to be regenerated are primarily hardwood stands. The 17,000 acres to be reforested after cutting are primarily aspen stands to be converted to red pine or white spruce.

Reforestation priorities will be established on the basis of highest site potential. In all types of reforestation as large a contiguous area as possible, preferably 40 acres or more, should be treated at one time. Reforesting areas less than 10 acres in size is to be avoided.

The planned planting program for Fiscal Years 1964-1967 is as follows:

<u>Fiscal Year</u>	<u>Area-Acres</u>
1964	2,500
1965	2,300
1966	2,000
1967	<u>2,700</u>
All	9,500

<u>Species</u>	<u>M Trees</u>
Red pine	4,050
Jack pine	80
White spruce	2,520
Black spruce	<u>1,040</u>
All	7,690

Direct seeding for the first half of this plan period will involve only minor acreages.

Timber Stand Improvement

Most of the timbered commercial forest land within the Forest is in need of some kind of cultural treatment. However, not all work is economically feasible under present conditions. It is imperative that stands be examined carefully and priorities established to treat those areas which will give the greatest return on the investment. Sale areas will receive as much treatment as possible under the K-V program. Other areas will be treated with other funds as they become available.

The total program is estimated to involve 123,100 acres of release and weeding and 2,400 acres of red pine pruning (Table 10). White pine pruning needs are more difficult to assess. It is estimated that about 2,500 acres of white pine can be pruned economically. Established Forest guides will be used to assess the feasibility of white pine management. Hardwood pruning is very low priority work.

Table 10. Area of Commercial Forest Land by District and Timber Stand Improvement Needs (acres).

District	: Release : & Weeding	: Red Pine : Pruning
Bergland	17,200	0
Bessemer	20,600	200
Iron River	23,300	200
Kenton	26,100	1,000
Ontonagon	14,800	600
Watersmeet	<u>21,100</u>	<u>400</u>
Total	123,100	2,400

The greatest acreage needing treatment is in the northern hardwood type (Appendix, Table 9). In pole stands crop tree thinning is highest priority. In sawtimber stands crop tree thinning and regeneration through cull and wolf tree removal are both needed to maintain productivity.

Insect and Disease Control

The objective shall be to reduce insect and disease damage to the Forest. Timber management measures to maintain healthy and vigorous stands are essential to minimize volume losses from these causes. The more serious insects and diseases present on the Forest are:

1. White pine blister rust infection is present throughout most of the Forest. Most of the control area has been worked over and about 60% is now on a maintenance basis. Converting white pine stands in high risk areas to more suitable species shall be carried out as rapidly as funds and markets for white pine will allow.
2. White pine weevil is present in all pine plantations. It is most serious in white pine stands where the infestation more often than not leaves the tree completely worthless for commercial timber products. Overhead cover should be maintained over all white pine stands less than 25 feet tall. This offers some control and at present appears to be the only practical control possible.
3. Some other endemic insects present are:
 - a. Jack pine budworm.
 - b. Forest tent caterpillar.
 - c. Saratoga spittlebug.
 - d. Red-headed pine sawfly.
 - e. Larch sawfly.

Pest detection methods for these and other insects are specified in FSH 5220.

Control measures for insect outbreaks will be guided by the Area Entomologist.

To provide adequate insect and disease detection and control the following program is to be followed:

1. Hold training sessions to assist Forest personnel to recognize damaging insects and disease and their control.
2. Apply control measures as rapidly as economics permit, after careful determination of costs and returns under alternative courses of action.
3. Avoid site and tree damage in logging operations.
4. Remove high risk trees whenever feasible to eliminate potential sources of infestation.
5. Use care in selecting and handling cones, seed, and planting stock. Plant only disease and insect free stock.

6. Plant the best species for the site to obtain the most vigorous tree growth and to avoid pest problems associated with poor growth.
7. Alter stand composition or density to discourage pest problems.
8. Encourage large stand management. Large stands can be protected more economically than many small scattered stands.

Animal Damage

The inventory indicated that deer damage had occurred on 38,000 acres of 69,000 acres that were susceptible to damage. Damage is difficult to assess but it is felt that evidence of more than 5 successive browsings of the leader constitutes severe damage to a tree. Almost 7,000 acres are estimated to fall in this class.

The present Forest program for greater hunter use and deer harvest will continue. Where these measures fail habitat manipulation will be practiced to minimize damage, especially in the northern hardwood type.

Coordination with Other Uses.

Timber management will be coordinated with other uses according to FSM 2405 and the management direction established in the Regional Guide.

Plans for cutting in specific areas will be individually adjusted according to the coordination requirements established by the Regional Guide and by the respective District multiple use plans.

Functional activities with other than a timber growth objective, when conducted in the General Forest Zone, will conform to the management direction and the coordination requirements for that zone.

Access Roads

Roads constructed by purchasers of National Forest timber will be on approved locations. Construction standards will be specified to obtain the lowest total timber transportation costs consistent with erosion control standards. Roads will be built on permanent summer haul locations insofar as possible. Consideration will be given to planning and constructing permanent timber access roads by the Forest Service to secure the removal of inaccessible blocks of timber.

Due to the increasing freight rates on the railroads and the Wisconsin paper mills purchasing an increasing amount of round wood only on trucks it is imperative that the primary road system be completed at an early date so as to keep round wood from the Forest competitive with Canadian wood as well as native wood closer to the markets.

Property Lines

All property lines between National Forest lands and private lands will be located and marked on the ground prior to the preparation of any timber sale or during the planning phase of any cultural work. Any disputes over the location of a property line, or when a property line is in doubt, will be referred to the registered land surveyor on the Forest.

Allowable Cut

Silvicultural needs as determined on the inventory sample points were used to determine the allowable cut. Age class regulation was considered in modifying the cut as set by prescriptions. The method of computing allowable cut area was tabular. Allowable cut volume was based on inventory point sample tallies of trees to be cut.

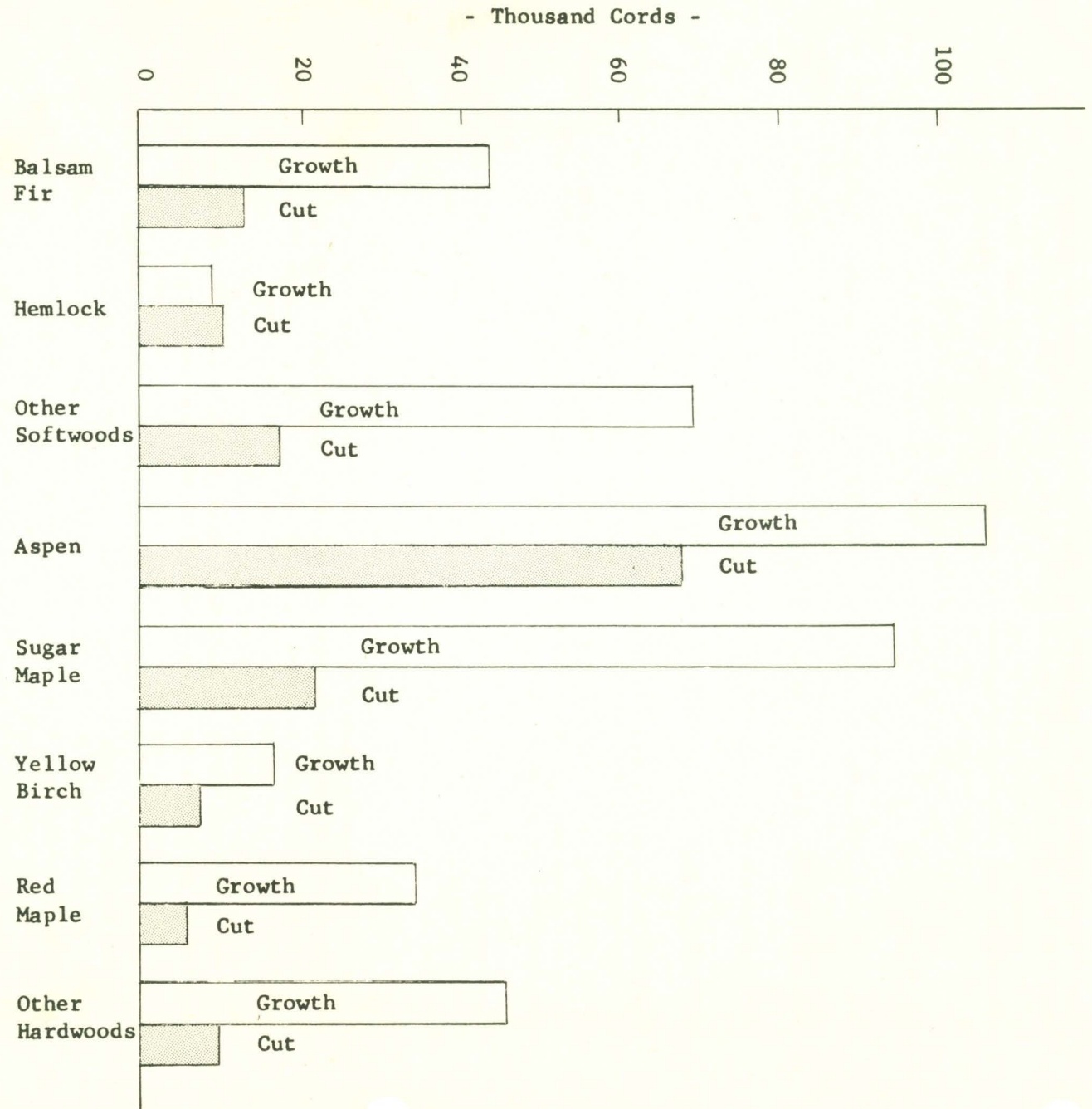
A large area of the Forest contains short-lived transitory species and stand composition is changing. It will be many years before age class regulation will control the allowable cut.

Annual allowable cut is generally less than growth (Fig. 5). Aspen cut, although apparently heavy, is only 63% of growth. Most aspen stands are in the period of their rotation where maximum periodic growth is occurring. If allowable cuts in aspen types cannot be met, drastic measures such as underplanting over-mature stands may have to be considered.

Allowable cut volume in the northern hardwood species is much less than growth volume. This is due primarily to the predominance of young stands.

The cut of balsam fir is only 29% of its growth. The low cut is probably due to predominance of a young age class in the balsam fir species. Young balsam fir is found in nearly all timber types on the Forest. Merchantable balsam fir should be integrated as a sale product in all sale areas whenever possible.

Figure 5. Net Periodic Annual Growth and Annual Allowable Cut.



The annual allowable cut area amounts to 19,090 acres of which 7,970 acres are in regeneration cuts and 11,120 acres are in intermediate cuts (Table 11). The allowable cut is fairly well distributed over the Forest although Bergland and Bessemer are somewhat lower than the other four Districts.

Table 11. Annual Allowable Cut Area Allocation
by District & Type of Cutting (Acres).

District	Total	Regeneration Cuts	Intermediate Cuts
Bergland	2,250	1,040	1,210
Bessemer	2,610	1,290	1,320
Iron River	3,490	1,440	2,050
Kenton	3,800	1,680	2,120
Ontonagon	3,710	1,310	2,400
Watersmeet	<u>3,230</u>	<u>1,210</u>	<u>2,020</u>
Total	19,090	7,970	11,120

Over three-fourths of the allowable cut area is to come from the northern hardwoods and aspen types (Table 12 & Appendix, Table 10).

For all types the intermediate cuts are to be considered as goals and not as limitations. If markets improve during the plan period the intermediate cut area should increase. In northern hardwoods, however, the sawtimber acreage examined and budgeted for sale will be strictly controlled to insure a steady flow of sawtimber through the plan period.

Regulation of the regeneration cuts will be by area with volume as a check (R9-2413.22). Prescriptions will follow the various Regional timber management guides.

District allocation of the allowable cut area and volume is shown in Tables 11-13 of Appendix A.

Compartments scheduled for the first 3 years of the plan period are included in the action plan. This 3-year cutting budget will be revised and extended annually.

Control records will be maintained as described in FSH 2413.4.

Table 12. Annual Allowable Cut Area by Forest Type & Kind of Cutting (Acres).

Forest Type	: : Total	: Regeneration : Cuts	: Intermediate : Cuts
White & Red Pine✓	640	80	560
Jack Pine✓	180	30	150
Spruce-fir✓	790	790	
Swamp Conifers✓	860	420	440
Northern Hardwoods-Hemlock	9,570		9,570
Lowland Hardwoods	400		400
Aspen-Birch	<u>6,650</u>	<u>6,650</u>	<u> </u>
Total	19,090	7,970	11,120

Following is a brief discussion of the allowable cut for each type:

White pine - Rotation 140 years

Of the 11,100 acres of white pine, 800 acres are to have a regeneration cut and 4,000 acres are to have intermediate cuts. Since white pine is such a high risk species only areas of low blister rust susceptibility will be considered for shelterwood cuts and white pine regeneration. In areas of medium or high susceptibility clearcuts to remove all white pine and reforestation to other species will be the policy.

Improvement cuts at 10-year intervals will be made to remove other species as well as poor quality and defective white pine. If the site is suitable the shelterwood cut will be made at about age 120 and the overstory removal cut of the residual seed trees will be made at about age 140.

Red pine - Rotation 140 years

Because of the young age classes present in the red pine type no regeneration cuts are scheduled for this plan period. However, intermediate cuts of 1,600 acres are recommended. Intermediate cuts should begin at age 30-35 or after the basal area reaches approximately 130 square feet on poor sites and 140 square feet on medium and good sites.

Jack pine - Rotation 60 years

Total area in this type is 25,400 acres. Allowable cut acres involve 300 acres of regeneration cuts and 1,500 acres of intermediate cuttings. All stands 55 years and older are to be given regeneration cuts (clearcuts) during the plan period. Stands of site 55 or higher are to be reforested to red pine after cutting. On poorer sites scarification and seeding will be done to encourage natural regeneration. If natural regeneration is not satisfactory in 3 years after cutting, the areas should be regenerated artificially.

Spruce-fir - Rotation 45-80 years

Recommended cut for the spruce-fir type is 7,900 acres - all regeneration. Stands predominantly balsam fir or fir and aspen and over 45 years of age should be regenerated. Stands below 45 years but pathologically mature should also be regenerated.

Although no intermediate cuts are given for this plan period they should be made in stands running heavy to white spruce. If white spruce stocking is sufficient to constitute the final crop the stand should be managed as white spruce and the rotation extended to approximately 80 years.

Swamp conifers - Rotation 100 years

This includes all black spruce, tamarack and cedar types. In some cases the type is a mixture of all 3 types.

If markets are available for the products produced, all sawtimber and large poletimber stands are to be cut over during the plan period. In large stands strip clearcutting will be done. Areas in these large stands not clearcut will be given improvement cuts to remove short-lived species and to improve the composition of the residual stand. Good quality cedar and black spruce should be favored in these improvement cuts.

Regeneration cuts are recommended for 4,200 acres and intermediate cuts on 4,400 acres.

Northern hardwoods (including hemlock and lowland hardwoods)

The northern hardwood type is almost all in the sugar maple subtype. The stands are predominantly young sapling and pole stands with varying amounts of residual low-quality overwood. Due to factors still under investigation it will be desirable to postpone decision on the silvicultural system to be employed until the need for regeneration is more imminent, 10 to 20 years hence. If shelterwood or seed tree regeneration is adopted the rotation will likely fall between 120 and 140 years. If selection is adopted the cutting cycle will likely be between 10 and 15 years - the period required for replacement of 25 to 35 square feet of basal area per acre.

During this plan period intermediate cutting will be used in this type. Regional guidelines will govern this cutting. They provide basal area stocking control within a range which will not initiate significant regeneration until after the first two entries.

In the next plan period a clear decision will be needed for the small acreage of hardwoods and associated types that are of large sawtimber size and have received preparatory cuts in which the poorer quality timber was removed.

Intermediate cuts are recommended for 99,700 acres in the hardwood and hemlock associations.

Aspen-paper birch - Rotation 40-45 years.

Make regeneration cuts in all stands over 40 years of age. Such cuts may be made earlier where necessary to release an understory of more desirable species.

Intermediate cuts are not normally recommended for pure aspen stands. Although a few excellent aspen sites could be thinned from below for a final sawlog harvest cut, the present demand, stumpage value and administrative cost of marking, make such intensive management impractical. However, intermediate cuts should be made in mixed stands where a gradual conversion to more desirable species is possible. Paper birch will be considered desirable if the quality is such that it will produce sawlogs.

Regeneration cuts are recommended for 66,500 acres.

Estimated Cut Volume

The estimated volume that can be cut from the allowable cut acres amounts to 155,650 cords of growing stock including 9,720,000 board feet of sawlogs. (Table 13 & Appendix, Table 12.)

Aspen makes up most of the cordwood volume to be cut while the northern hardwoods and hemlock make up most of the sawtimber cut (Table 14). The volume of sawtimber size trees of aspen, balsam fir, spruce, jack pine, cedar and tamarack is not included in the sawlog volume because these species are normally marketed as pulpwood or round wood products and not as sawlogs.

Table 13. Net Annual Allowable Cut Volume of Growing Stock and Sawlog Material by District.

District	: Growing : : Stock :	Cordwood	: : Sawlogs
	Cords <u>1/</u>	Cords	MBM <u>2/</u>
Bergland	18,920	16,120	1,400
Bessemer	21,330	18,930	1,200
Iron River	31,550	27,370	2,090
Kenton	31,240	27,720	1,760
Ontonagon	31,110	27,270	1,920
Watersmeet	<u>21,500</u>	<u>18,800</u>	<u>1,350</u>
Total	155,650	136,210	9,720

1/ Live merchantable trees 5.0" d.b.h. and larger to a variable top d.i.b. of not less than 4.0".

2/ Softwood sawtimber species - 11"+ d.b.h. to a variable top d.i.b. of not less than 8.0".
Hardwood sawtimber species - 13"+ d.b.h. to a variable top d.i.b. of not less than 9.0".

Table 14. Net Annual Allowable Cut Volume
by Species and Kind of Material.

Species	Growing Stock <u>1/</u>	Cordwood Material	Sawlog Material <u>2/</u>
	Cords	Cords	MBM
Balsam Fir-	12,380	12,380	
White & Red Pine ✓	3,830	1,490	1,170
Hemlock ✓	8,820	5,420	1,700
Jack Pine ✓	1,410	1,410	
Spruce ✓	4,490	4,490	
Cedar -	6,870	6,870	
Tamarack -	<u>1,040</u>	<u>1,040</u>	
All Softwoods	38,840	33,100	2,870
Aspen ✓	67,670	67,670	
Basswood	3,630	2,870	380
Yellow Birch	7,600	5,460	1,070
Sugar Maple	20,600	12,760	3,920
Red Maple	6,030	4,790	620
Ash	2,300	1,480	410
Elm	2,490	1,790	350
Paper Birch	5,030	4,830	100
Misc. Hardwoods	<u>1,460</u>	<u>1,460</u>	
All Hardwoods	116,810	103,110	6,850
All Species	<u>155,650</u>	<u>136,210</u>	<u>9,720</u>

1/ All live merchantable timber 5.0" d.b.h. and larger to a variable top
d.i.b. of not less than 4.0".

2/ Softwoods: 11.0" d.b.h. and larger to a variable top of not less than 8.0".
Hardwoods: 13.0" d.b.h. and larger to a variable top of not less than 9.0".

Statistical Summary

Area by type-size-density classes was determined directly from photo-interpreted aerial photos taken in the summer of 1960.

A subsampling or cluster sample design was used to estimate volume and certain area information. Randomly selected compartments constituted the primary units and ten-factor variable radius plots were the secondary sampling units (Appendix C).

A total of 328 compartments were sampled on the 6 districts between January, 1961 and February, 1962. A total of 4,143 plots were taken and of these about 1,700 are permanently located and marked for remeasurement.

Sampling error for the Forest is $\pm 4\%$ for growing stock and $\pm 9\%$ for the sawlogs (Table 15).

Table 15. Total Net Volume & Sampling Error of Growing Stock & Sawtimber by District - Ottawa National Forest.

District	Growing Stock M Cords	Sampling Error $\frac{1}{2}$ %	Sawlog Material MMBM	Sampling Error $\frac{1}{2}$ %
Bergland	966	± 10	93	± 24
Bessemer	1,244	± 9	105	± 23
Iron River	1,201	± 11	129	± 21
Kenton	1,447	± 10	147	± 20
Ontonagon	1,344	± 9	131	± 23
Watersmeet	<u>1,237</u>	<u>± 7</u>	<u>116</u>	<u>± 16</u>
Total	7,439	± 4	721	± 9

1/ Two standard errors.

Current Action Plan

The purpose of the current action plan is to set up a schedule of work to carry out the needed silvicultural practices prescribed by the timber management plan and to provide an inventory of cultural treatments needed.

The action plan will be kept posted annually by the Ranger noting accomplishment on the proper approved regional forms and extending the action plan forward. The current and past action plan will remain a part of the timber management plan through the plan period.

Examination of the budgeted compartments will be made by an experienced forester. Stands will be examined and prescribed for in accordance with R-9 timber management guides and Forest multiple-use plan. Special use areas, if they exist in the compartment, will be examined and prescribed for by the District Ranger.

Before marking is begun on a sale, a forester will review the prescription on the ground with the markers. A copy of the prescription will be used as a working tool in conjunction with the marking rules to insure that proper treatment is given the stand.

Planned P&M Cultural Work

At the present time the Forest has plans for P&M cultural work but prescriptions have not been made. This is due in part to the amount of planned work accomplished with the use of Accelerated Public Works funds plus the heavy demands placed on all personnel during the Accelerated Public Works program.

The present plans are to get detailed cultural work plans once again at least 2 years in advance by the end of F.Y. 1964 and 3 years in advance by 1965.

Cutting Budget

The budget through F.Y. 1966 is found in Appendix D. Each year another year's budget will be added.

Road Development Schedule

The schedule through F. Y. 1965 is found in Appendix D.

APPENDIX A

- Table 1. Total Area Summaries by Forest and Districts.
- Table 2. Area of Timbered Commercial Forest Land by Forest Type and Age Class for the Forest and Districts.
- Table 3. Area of Timbered Commercial Forest Land by Forest Type and Site Class for the Forest and Districts.
- Table 4. Total Net Volume on Timbered Commercial Forest Land by Species and Kind of Material.
- Table 5. Total Net Volume of Growing Stock on Timbered Commercial Forest Land by Species and District.
- Table 6. Total Net Volume of Sawlog Material on Timbered Commercial Forest Land by Species and District.
- Table 7. Total Net Periodic Annual Growth of Growing Stock on Timbered Commercial Forest Land by Species and District.
- Table 8. Total Net Periodic Annual Growth of Sawlog Material on Timbered Commercial Forest Land by Species and District.
- Table 9. Area of Timbered Commercial Forest Land by Forest Type and Timber Stand Improvement Needs for the Forest and Districts.
- Table 10. Annual Allowable Cut Area by Forest Type and Type of Cutting.
- Table 11. Annual Allowable Cut Area by Forest Type, District and Type of Cutting.
- Table 12. Net Annual Allowable Cut Volume of Growing Stock by Species and District.
- Table 13. Net Annual Allowable Cut Volume of Sawlog Material by Species and District.

Table 1. Total Area Summary

Ottawa National Forest (Acres)									
Forest Type	Total	Reproduction		Small Poles		Large Poles		Sawtimber	
		Poor	Adequate	Poor	Adequate	Poor	Adequate	Poor	Adequate
White Pine	11,080	24	292	212	527	1,600	1,832	3,933	2,660
Red Pine	21,011	2,096	11,423	562	2,370	517	622	2,243	1,178
Jack Pine	25,432	466	6,875	2,966	12,714	1,171	1,061	136	43
Spruce-fir	46,262	1,996	9,576	9,369	14,475	5,378	4,487	611	370
Black Spruce <u>2/</u>	2,685	60	345	299	1,696	15	264		6
Hemlock	26,737		42	12	58	951	439	11,639	13,596
Swamp Conifers	54,221	2,458	14,831	11,255	14,989	4,322	5,335	754	277
Northern Hardwoods	348,338	1,695	64,243	10,952	73,109	32,471	12,541	114,621	38,706 <u>1/</u>
Oak	1,995		59	597	885	335	30	89	
Lowland Hardwoods	16,014	86	1,759	1,148	1,730	2,801	1,732	4,530	2,228
Aspen	226,223	3,154	23,896	50,790	73,224	30,370	37,306	3,941	3,542
Paper Birch	11,088	4	824	2,518	5,948	947	714	133	
Total	791,086	12,039	134,165	90,680	201,725	80,878	66,363	142,630	62,606
Nonstocked Forest Land	Area	Nonforest Land		Area		Other Land		Area	
Open	6,393	Marsh & Muskeg		16,244		Unproductive Upland		189	
Upland Brush	8,201	Water		5,981		Unproductive Lowland		7,905	
Lowland Brush	21,516	Other		3,124		Unregulated		4,083	
Total	36,110	Total		25,349		Total		12,177	

Total Land Area 864,722 Acres1/ Includes 455 acres of M9.2/ Kenton District only.

Bergland District
(Acres)

Total Land Area	110,108	Acres
-----------------	---------	-------

Bessemer District
(Acres)

Total Land Area	156,114	Acres
-----------------	---------	-------

Iron River District
(Acres)

Total Land Area 133,675 Acres

Table 1. Total Area Summary

Kenton District (Acres)										
Forest Type	:	Total	Reproduction		Small Poles		Large Poles		Sawtimber	
			Poor	Adequate	Poor	Adequate	Poor	Adequate	Poor	Adequate
White Pine	:	2,123	14		56	18	97	188	916	834
Red Pine	:	9,151	1,113	4,236	355	352	278	464	1,573	780
Jack Pine	:	14,436	318	3,898	2,157	6,851	653	464	83	12
Spruce-fir	:	6,186	313	1,294	844	1,990	485	1,120	39	101
Black Spruce	:	2,685	60	345	299	1,696	15	264		6
Hemlock	:	9,214		42	8		80	130	3,006	5,948
Swamp Conifers	:	8,196	359	1,689	1,836	1,825	921	1,340	163	63
Northern Hardwoods	:	51,670	189	9,136	1,983	11,006	4,674	2,486	14,318	7,878 ^{1/}
Oak	:	915		59	401	357	98			
Lowland Hardwoods	:	1,818	27	149	68	153	316	148	680	277
Aspen	:	48,234	1,135	7,201	9,404	14,252	5,094	8,884	1,094	1,170
Paper Birch	:	5,061		542	748	2,965	472	201	133	
Total	:	159,689	3,528	28,591	18,159	41,465	13,183	15,689	22,005	17,069
Nonstocked Forest Land		Area	Nonforest Land			Area	Other Land			Area
Open		2,610	Marsh & Muskeg			4,397	Unproductive Upland			44
Upland Brush		1,447	Water			1,505	Unproductive Lowland			1,485
Lowland Brush		3,889	Other			585	Unregulated			1,093
Total		7,946	Total			6,487	Total			2,622

Total Land Area 176,744 Acres^{1/} Includes 101 acres of M9.

Table 1. Total Area Summary

Ontonagon District (Acres)									
Forest Type	Total	Reproduction		Small Poles		Large Poles		Sawtimber	
		Poor	Adequate	Poor	Adequate	Poor	Adequate	Poor	Adequate
White Pine	836		29			37	85	426	259
Red Pine	4,505	645	2,145	102	976	96	87	194	260
Jack Pine	5,143	45	1,258	369	3,096	216	142	17	
Spruce-fir	4,522	477	1,086	541	1,682	238	270	9	219
Black Spruce									
Hemlock	5,907					261	62	3,115	2,469
Swamp Conifers	2,072	38	281	446	511	20	425	248	103
Northern Hardwoods	57,068	124	11,633	590	8,628	2,422	1,884	25,348	6,439 ^{1/}
Oak	467			150	233	61	23		
Lowland Hardwoods	2,291		403	15	485	41	20	588	739
Aspen	46,721	274	4,850	8,376	20,621	4,375	7,291	548	386
Paper Birch	1,611		45	368	1,156	42			
Total	131,143	1,603	21,730	10,957	37,388	7,809	10,289	30,493	10,874
Nonstocked Forest Land	Area	Nonforest Land		Area		Other Land		Area	
Open	445	Marsh & Muskeg		1,644		Unproductive Upland		7	
Upland Brush	786	Water		467		Unproductive Lowland		232	
Lowland Brush	783	Other		303		Unregulated		1,113	
Total	2,014	Total		2,414		Total		1,352	

Total Land Area 136,923 Acres^{1/} Includes 208 acres of M9.

Table 1. Total Area Summary

Watersmeet District									
(Acres)									
Forest Type	Total	Reproduction		Small Poles		Large Poles		Sawtimber	
		Poor	Adequate	Poor	Adequate	Poor	Adequate	Poor	Adequate
White Pine	643		25	16		40	71	354	137
Red Pine	3,639	200	2,579	33	480	31	49	149	118
Jack Pine	4,591	103	1,504	303	1,975	213	436	26	31
Spruce-fir	7,454	207	2,110	1,223	2,501	472	733	194	14
Black Spruce									
Hemlock	4,299				20		52	1,313	2,914
Swamp Conifers	11,508	411	3,025	2,359	3,552	923	1,118	112	8
Northern Hardwoods	64,097	908	18,752	2,151	10,975	4,043	2,385	18,692	6,191 ^{1/}
Oak	547			36	287	147	7	70	
Lowland Hardwoods	1,609	28	82	131	68	412	190	580	118
Aspen	36,931	504	2,745	9,264	10,316	6,829	6,410	717	146
Paper Birch	946	4	54	379	247	229	33		
Total	136,264	2,365	30,876	15,895	30,421	13,339	11,484	22,207	9,677
Nonstocked Forest Land	Area	Nonforest Land		Area		Other Land		Area	
Open	1,447	Marsh & Muskeg		3,695		Unproductive Upland		11	
Upland Brush	1,698	Water		1,416		Unproductive Lowland		2,437	
Lowland Brush	3,293	Other		586		Unregulated		311	
Total	6,438	Total		5,697		Total		2,759	

Total Land Area 151,158 Acres^{1/} Includes 74 acres of M9.

Table 2. Area of Timbered Commercial Forest Land by Forest Type
and Age Class, Ottawa National Forest.

(Acres)																			
Forest Type	:	Total	:	Age - Years							All Age								
				0-25	:	26-35	:	36-45	:	46-55		:	56-65	:	66-75	:	76-85	:	86+
White Pine		11,100		200				300		2,000		4,800		500		900		2,400	
Red Pine		21,000		15,300		1,000		100		1,300		1,200		700		1,200		200	
Jack Pine		25,400		7,900		13,200		3,600		700									
Spruce-fir		46,300		6,200		10,100		15,100		6,800		7,000		500		500		100	
Hemlock		26,700																	26,700
Swamp Conifers		56,900		500		2,200		7,500		7,900		2,700		800		1,000		1,700	32,600
Northern Hdws.		348,400																	348,400
Oak		2,000																	2,000
Lowland Hdws.		16,000																	16,000
Aspen		226,200		30,000		97,600		66,000		23,300		8,600		700					
Paper Birch		11,100		700		2,300		4,100		2,600		1,400							
Total		791,100		60,800		126,400		96,700		44,600		25,700		3,200		3,600		4,400	425,700

Table 2. Area of Timbered Commercial Forest Land by Forest Type
and Age Class, Bergland District.
(Acres)

Forest Type	Total	Age - Years								All Age
		0-25	26-35	36-45	46-55	56-65	66-75	76-85	86+	
White Pine	800			*	300	400	*		100	
Red Pine	100	*	*		100					
Jack Pine										
Spruce-fir	7,000	700	1,500	2,500	1,200	800	200	100	*	
Hemlock	2,100									2,100
Swamp Conifers	3,400		100	200	500	100	100	100	300	2,000
Northern Hdws.	54,100									54,100
Oak	*									
Lowland Hdws.	3,900									3,900
Aspen	29,700	2,900	12,800	7,800	5,400	600	200			
Paper Birch	100		*	*	100	*				
Total	101,200	3,600	14,400	10,500	7,600	1,900	500	200	400	62,100

* Less than 50 acres.

Table 2. Area of Timbered Commercial Forest Land by Forest Type
and Age Class, Bessemer District.
(Acres)

Forest Type	Total	Age - Years								All Age
		0-25	26-35	36-45	46-55	56-65	66-75	76-85	86+	
White Pine	*									
Red Pine	2,100	1,800	300							
Jack Pine	100		100							
Spruce-fir	7,000	700	1,600	3,300	700	700		*		
Hemlock	3,700									3,700
Swamp Conifers	19,100		600	1,100	3,000	200	300	500	300	13,100
Northern Hdws.	69,100									69,100
Oak										
Lowland Hdws.	5,600									5,600
Aspen	35,100	4,500	16,800	13,000	800					
Paper Birch	100		100							
Total	141,900	7,000	19,500	17,400	4,500	900	300	500	300	91,500

* Less than 50 acres.

Table 2. Area of Timbered Commercial Forest Land by Forest Type
and Age Class, Iron River District.

(Acres)											
Forest Type	Total	Age - Years									All Age
		0-25	26-35	36-45	46-55	56-65	66-75	76-85	86+		
White Pine	6,600	200		200	1,400	2,800	200	500	1,300		
Red Pine	1,600	1,100	*	*	200	200	100	*			
Jack Pine	1,200	200	800	200	*						
Spruce-fir	14,100	2,200	2,300	4,500	2,400	2,500		200			
Hemlock	1,500									1,500	
Swamp Conifers	9,900	400	900	2,400	2,800	200		200	300	2,700	
Northern Hdws.	52,300									52,300	
Oak	100									100	
Lowland Hdws.	800									800	
Aspen	29,500	4,700	5,600	11,000	4,400	3,600	200				
Paper Birch	3,300	200	500	800	800	1,000					
Total	120,900	9,000	10,100	19,100	12,000	10,300	500	900	1,600	57,400	

* Less than 50 acres.

Table 2. Area of Timbered Commercial Forest Land by Forest Type
and Age Class, Kenton District.
(Acres)

Forest Type	Total	Age - Years									All Age
		0-25	26-35	36-45	46-55	56-65	66-75	76-85	86+		
White Pine	2,200	*		100	100	1,000	100	200	700		
Red Pine	9,100	5,900	100	100	800	800	500	900			
Jack Pine	14,400	3,900	8,200	1,900	400						
Spruce-fir	6,200	1,100	1,000	1,700	1,100	1,200	*	100	*		
Black Spruce	2,700		400	1,200	200	600	200	100			
Hemlock	9,200									9,200	
Swamp Conifers	8,200	100		1,800	200	200			500	5,400	
Northern Hdws.	51,700									51,700	
Oak	900									900	
Lowland Hdws.	1,800									1,800	
Aspen	48,200	6,700	14,700	16,100	7,400	3,200	100				
Paper Birch	5,100	500	500	2,400	1,300	400					
Total	159,700	18,200	24,900	25,300	11,500	7,400	900	1,300	1,200	69,000	

* Less than 50 acres.

Table 2. Area of Timbered Commercial Forest Land by Forest Type
and Age Class, Ontonagon District.
(Acres)

Forest Type	Total	Age - Years								All Age
		0-25	26-35	36-45	46-55	56-65	66-75	76-85	86+	
White Pine	800	*		*	100	300	100	100	200	
Red Pine	4,500	3,600	200		200	100	100	200	100	
Jack Pine	5,100	2,000	2,000	1,000	100					
Spruce-fir	4,500	600	1,200	1,500	600	300	100	100	100	
Hemlock	5,900									5,900
Swamp Conifers	2,100				600	100			300	1,100
Northern Hdws.	57,100									57,100
Oak	500									500
Lowland Hdws.	2,300									2,300
Aspen	46,700	7,200	27,900	7,900	3,200	400	100			
Paper Birch	1,600	*	900	500	200					
Total	131,100	13,400	32,200	10,900	5,000	1,200	400	400	700	66,900

* Less than 50 acres.

Table 2. Area of Timbered Commercial Forest Land by Forest Type
and Age Class, Watersmeet District.
(Acres)

Forest Type	Total	Age - Years									All Age
		0-25	26-35	36-45	46-55	56-65	66-75	76-85	86+		
White Pine	700	*		*	100	300	100	100	100		
Red Pine	3,600	2,900	400		*	100	*	100	100		
Jack Pine	4,600	1,800	2,100	500	200						
Spruce-fir	7,500	900	2,500	1,600	800	1,500	200				
Hemlock	4,300									4,300	
Swamp Conifers	11,500		200	800	600	1,300	200	100		8,300	
Northern Hdws.	64,100									64,100	
Oak	500									500	
Lowland Hdws.	1,600									1,600	
Aspen	37,000	4,000	19,800	10,200	2,100	800	100				
Paper Birch	900		300	400	200						
Total	136,300	9,600	25,300	13,500	4,000	4,000	600	300	200	78,800	

* Less than 50 acres.

Table 3. Area of Timbered Commercial Forest Land by Forest Type
and Site Index Classes, Ottawa National Forest.
(Acres)

Forest Type	Total	Site Index Class							
		20	30	40	50	60	70	80	
White Pine	11,100			600	6,500	2,900	1,100		
Red Pine	21,000			200	6,600	13,700	500		
Jack Pine	25,400		100	3,400	10,700	10,400	800		
Spruce-fir	46,300		200	5,100	25,500	14,800	700		
Hemlock	26,700					26,700			
Swamp Conifers	56,900	1,400	18,000	22,500	11,300	3,500	200		
Northern Hardwoods	348,400				3,200	344,600	600		
Oak	2,000				400	1,600			
Lowland Hardwoods	16,000			100	4,000	11,900			
Aspen	226,200			1,500	9,900	74,400	115,900	24,500	
Paper Birch	11,100			100	1,200	5,900	3,900		
Total	791,100	1,400	18,300	33,500	79,300	510,400	123,700	24,500	

Table 3. Area of Timbered Commercial Forest Land by Forest Type
and Site Index Classes, Bergland District.
(Acres)

Forest Type	Total	Site Index Class						70	80
		20	30	40	50	60			
White Pine	800			100	500	200			
Red Pine	100				100	*			
Jack Pine									
Spruce-fir	7,000			600	5,100	1,300			
Hemlock	2,100					2,100			
Swamp Conifers	3,400	100	1,300	1,100	900				
Northern Hdws.	54,100				700	53,400			
Oak									
Lowland Hdws.	3,900			100	1,000	2,800			
Aspen	29,700				2,200	11,200	13,000		3,300
Paper Birch	100					100			
Total	101,200	100	1,300	1,900	10,500	71,100	13,000		3,300

* Less than 50 acres.

Table 3. Area of Timbered Commercial Forest Land by Forest Type
and Site Index Classes, Bessemer District.
(Acres)

Forest Type	Total	Site Index Class							
		20	30	40	50	60	70	80	
White Pine	*					*			
Red Pine	2,100				800	1,300			
Jack Pine	100				100				
Spruce-fir	7,000			200	5,500	1,300			
Hemlock	3,700					3,700			
Swamp Conifers	19,100	400	8,100	7,600	3,000	*			
Northern Hdwds.	69,100				1,200	67,900			
Oak									
Lowland Hdwds.	5,600				1,500	4,100			
Aspen	35,100					11,600	19,100	4,400	
Paper Birch	100			100					
Total	141,900	400	8,100	7,900	12,100	89,900	19,100	4,400	

* Less than 50 acres.

Table 3. Area of Timbered Commercial Forest Land by Forest Type
and Site Index Classes, Iron River District.
(Acres)

Forest Type	Total	Site Index Class							
		20	30	40	50	60	70	80	
White Pine	6,600			400	3,900	1,700	600		
Red Pine	1,600				200	1,400	*		
Jack Pine	1,200			100	600	400	100		
Spruce-fir	14,100			2,400	5,100	6,400	200		
Hemlock	1,500					1,500			
Swamp Conifers	9,900	300	2,600	4,800	1,200	800	200		
Northern Hdwds.	52,300				100	52,200			
Oak	100					100			
Lowland Hdwds.	800					800			
Aspen	29,500			200	3,100	12,700	11,400	2,100	
Paper Birch	3,300				400	1,500	1,400		
Total	120,900	300	2,600	7,900	14,600	79,500	13,900	2,100	

* Less than 50 acres.

Table 3. Area of Timbered Commercial Forest Land by Forest Type
and Site Index Classes, Kenton District.
(Acres)

Forest Type	Total	Site Index Class							
		20	30	40	50	60	70	80	
White Pine	2,200			100	1,200	600	300		
Red Pine	9,100				2,200	6,500	400		
Jack Pine	14,400		100	2,600	6,800	4,400	500		
Spruce-fir	6,200			800	2,300	2,800	300		
Black Spruce	2,700	200	200	1,200	1,100				
Hemlock	9,200					9,200			
Swamp Conifers	8,200	200	1,200	2,600	1,800	2,400			
Northern Hdws.	51,700				400	50,800	500		
Oak	900				200	700			
Lowland Hdws.	1,800				200	1,600			
Aspen	48,200			1,200	4,100	21,400	18,100	3,400	
Paper Birch	5,100				800	2,700	1,600		
Total	159,700	400	1,500	8,500	21,100	103,100	21,700	3,400	

Table 3. Area of Timbered Commercial Forest Land by Forest Type
and Site Index Classes, Ontonagon District.
(Acres)

Forest Type	Total	Site Index Class						
		20	30	40	50	60	70	80
White Pine	800			*	500	200	100	
Red Pine	4,500			*	2,200	2,200	100	
Jack Pine	5,100			100	2,400	2,400	200	
Spruce-fir	4,500			400	3,400	700		
Hemlock	5,900					5,900		
Swamp Conifers	2,100		500	400	1,000	200		
Northern Hdws.	57,100					57,100		
Oak	500				200	300		
Lowland Hdws.	2,300				500	1,800		
Aspen	46,700				200	11,300	30,800	4,400
Paper Birch	1,600					1,000	600	
Total	131,100		500	900	10,400	83,100	31,800	4,400

* Less than 50 acres.

Table 3. Area of Timbered Commercial Forest Land by Forest Type
and Site Index Classes, Watersmeet District.
(Acres)

Forest Type	Total	Site Index Class							
		20	30	40	50	60	70	80	
White Pine	700				400	200	100		
Red Pine	3,600			200	1,100	2,300			
Jack Pine	4,600			600	800	3,200			
Spruce-fir	7,500		200	700	4,100	2,300	200		
Hemlock	4,300					4,300			
Swamp Conifers	11,500	200	4,100	4,800	2,300	100			
Northern Hdws.	64,100				800	63,200	100		
Oak	500					500			
Lowland Hdws.	1,600				800	800			
Aspen	37,000			100	300	6,200	23,500	6,900	
Paper Birch	900					600	300		
Total	136,300	200	4,300	6,400	10,600	83,700	24,200	6,900	

Table 4. Total Net Volume on Timbered Commercial Forest Land by Species & Kind of Material, 1963 - Ottawa National Forest.

Species	Growing Stock <u>1/</u>	Cordwood Material <u>2/</u>	Sawlog Material <u>3/</u>
	<u>Cords</u>	<u>Cords</u>	<u>MBM</u>
Balsam Fir	614,000	614,000	
White Pine	232,000	124,400	53,800
Red Pine	112,000	66,400	22,800
Hemlock	653,000	410,800	121,100
Jack Pine	125,000	125,000	
Spruce	424,000	424,000	
Cedar	353,000	353,000	
Tamarack	<u>43,000</u>	<u>43,000</u>	
Softwoods	2,556,000	2,160,600	197,700
Aspen	1,685,000	1,685,000	
Basswood	281,000	227,000	27,000
Yellow Birch	565,000	374,000	95,500
Sugar Maple	1,901,000	1,306,000	297,500
Red Maple	508,000	450,200	28,900
Black Cherry	86,000	81,400	2,300
Ash	218,000	169,200	24,400
Elm	295,000	220,800	37,100
Paper Birch	177,000	166,000	5,500
Miscellaneous	<u>71,000</u>	<u>60,400</u>	<u>5,300</u>
Hardwoods	5,787,000	4,740,000	523,500
All Species	8,343,000	6,900,600	721,200

1/ Net volume of all live merchantable trees 5.0" and larger to a variable top d.i.b. of not less than 4.0".

2/ Includes topwood in sawlog trees.

3/ Scribner decimal C Rule. Softwoods 9.0" and larger to a variable top of not less than 8.0". Hardwoods 11.0" and larger to a variable top of not less than 9.0".

Table 5. Total Net Volume of Growing Stock ^{1/} on Timbered Commercial Forest Land by Species and District.

Species	:Total:	Districts					
		:Bergland:	Bessemer:	Iron River:	Kenton:	Ontonagon:	Watersmeet
Thousand Cords							
Balsam Fir	614	68	122	113	123	75	113
White Pine	232	6	2	98	65	36	25
Red Pine	112	1	8	14	56	20	13
Hemlock	653	59	96	61	202	145	90
Jack Pine	125	*	*	6	67	24	28
Spruce	424	35	47	119	110	45	68
Cedar	353	36	108	30	60	54	65
Tamarack	<u>43</u>	<u>3</u>	<u>8</u>	<u>13</u>	<u>12</u>	<u>1</u>	<u>6</u>
Softwoods	2,556	208	391	454	695	400	408
Aspen	1,685	205	269	224	329	384	274
Basswood	281	51	56	24	32	74	44
Yellow Birch	565	63	102	102	98	88	112
Sugar Maple	1,901	335	345	315	272	318	316
Red Maple	508	66	70	101	85	110	76
Black Cherry	86	10	25	28	5	9	9
Ash	218	60	54	10	17	47	30
Elm	295	52	71	63	20	40	49
Paper Birch	177	5	4	53	69	25	21
Miscellaneous	<u>71</u>	<u>11</u>	<u>7</u>	<u>9</u>	<u>16</u>	<u>17</u>	<u>11</u>
Hardwoods	5,787	858	1,003	929	943	1,112	942
All Species	8,343	1,066	1,394	1,383	1,638	1,512	1,350

^{1/} Net volume of all merchantable trees 5.0" and larger to a variable top d.i.b. of not less than 4.0".

* Less than 500 cords.

Table 6. Total Net Volume of Sawlog Material 1/ on Timbered
Commercial Forest Land by Species and District.

Species	: Total	: Districts					
		: Bergland	: Bessemer	: Iron River	: Kenton	: Ontonagon	: Watersmeet
Thousand Board Feet - Scribner Rule							
White Pine	53,800	1,100	300	23,000	15,800	6,800	6,800
Red Pine	22,800	400		3,500	12,600	4,000	2,300
Hemlock	121,100	10,500	17,700	9,700	40,200	24,800	18,200
Basswood	27,000	3,200	4,700	3,100	4,000	5,700	6,300
Yellow Birch	95,500	9,700	19,800	18,000	17,100	13,100	17,800
Sugar Maple	297,500	49,900	44,300	51,600	45,600	58,900	47,200
Red Maple	28,900	4,500	3,000	6,000	3,900	6,600	4,900
Black Cherry	2,300	100	200	1,500	300	100	100
Ash	24,400	6,900	5,900	1,100	1,600	4,600	4,300
Elm	37,100	5,800	7,800	9,600	2,400	4,600	6,900
Paper Birch	5,500	100	100	2,000	2,100	200	1,000
Miscellaneous	5,300	400	1,400	300	1,300	1,500	400
All Species	721,200	92,600	105,200	129,400	146,900	130,900	116,200

1/ Softwoods 9.0" and larger to a variable top d.i.b. of not less than 8.0".
Hardwoods 11.0" and larger to a variable top d.i.b. of not less than 9.0".

Table 7. Total Net Periodic Annual Growth of Growing Stock ^{1/} on
Timbered Commercial Forest Land by Species & District.

Species	: Total :	Districts					
		:Bergland:	Bessemer:	Iron River:	Kenton:	Ontonagon:	Watersmeet
<u>Cords</u>							
Balsam Fir	43,200	6,100	10,500	7,000	7,600	4,000	8,000
W. & R. Pine	20,600	400	1,000	5,000	6,400	4,100	3,700
Hemlock	8,400	900	1,100	600	2,700	1,800	1,300
Jack Pine	17,200	*	100	700	10,100	3,100	3,200
Spruce	21,000	1,400	2,200	5,700	6,800	1,400	3,500
Cedar	10,400	1,100	4,700	800	1,100	800	1,900
Tamarack	<u>2,200</u>	<u>*</u>	<u>700</u>	<u>500</u>	<u>800</u>	<u>*</u>	<u>200</u>
Softwoods	123,000	9,900	20,300	20,300	35,500	15,200	21,800
Aspen	106,600	12,600	18,000	12,000	21,400	25,800	16,800
Basswood	12,800	3,100	2,000	1,100	1,300	3,300	2,000
Yellow Birch	15,900	2,200	2,600	2,200	2,300	3,400	3,200
Sugar Maple	93,400	16,400	19,200	12,800	13,500	14,000	17,500
Red Maple	33,700	4,600	5,600	4,300	5,600	8,100	5,500
Ash	11,200	2,800	2,700	800	700	2,600	1,600
Elm	15,100	2,900	3,900	2,700	800	2,200	2,600
Paper Birch	3,200	100	100	800	1,500	600	100
Miscellaneous	<u>7,400</u>	<u>1,000</u>	<u>1,400</u>	<u>1,900</u>	<u>700</u>	<u>1,300</u>	<u>1,100</u>
Hardwoods	299,300	45,700	55,500	38,600	47,800	61,300	50,400
All Species	422,300	55,600	75,800	58,900	83,300	76,500	72,200

^{1/} Net Volume of all merchantable trees 5.0" and larger to a variable top
d.i.b. of not less than 4.0".

* Less than 50 cords.

Table 8. Total Net Periodic Annual Growth of Sawlog Material ^{1/} on
Timbered Commercial Forest Land by Species and District.

Species	: Total :	Districts					
		:Bergland:	Bessemer:	Iron River:	Kenton:	Ontonagon:	Watersmeet
Thousand Board Feet - Scribner Decimal C							
W. & R. Pine	4,300	100	100	1,400	1,500	700	500
Hemlock	2,500	200	400	200	800	500	400
Basswood	2,500	400	400	100	300	900	400
Yellow Birch	3,100	200	500	600	500	500	800
Sugar Maple	9,900	1,800	1,300	1,900	1,200	2,000	1,700
Red Maple	3,200	400	400	800	500	700	400
Ash	1,900	500	500	100	100	400	300
Elm	2,900	500	800	600	200	300	500
Paper Birch	200	*	*	100	100	*	*
Miscellaneous	900	100	200	200	100	200	100
All Species	31,400	4,200	4,600	6,000	5,300	6,200	5,100

^{1/} Softwoods 9.0" and larger to a variable top d.i.b. of not less than 8.0".
Hardwoods 11.0" and larger to a variable top d.i.b. of not less than 9.0".

* Less than 50 M board feet.

Table 9. Area of Commercial Forest Land by Forest Type
and Timber Stand Improvement Needs.

Forest Type	: : Release & : Weeding	: : Pruning
White & Red Pine	1,000	2,400 <u>1/</u>
Jack Pine	600	
Spruce-fir	1,400	
Swamp Conifers	1,100	
Northern Hardwoods & Hemlock	98,300	
Aspen	17,700 <u>2/</u>	
Other Hardwoods	3,000 <u>2/</u>	_____
Total	123,100	2,400

1/ Red pine only. White pine pruning needs will be determined in conjunction with economic analysis of blister rust control.

2/ Most all of this acreage is to release more valuable understories.

Table 10. Annual Allowable Cut Area by Forest
Type and Type of Cutting (acres).
Ottawa National Forest

Forest Type	Total	Regeneration Cuts	Intermediate Cuts
White Pine	480	80	400
Red Pine	160	-	160
Jack Pine	180	30	150
Spruce-fir	790	790	-
Hemlock	1,540	-	1,540
Swamp Conifers	860	420	440
Northern Hardwoods	8,030	-	8,030
Lowland Hardwoods	400	-	400
Aspen-Birch	<u>6,650</u>	<u>6,650</u>	<u>-</u>
Total	19,090	7,970	11,120

Table 11. Annual Allowable Cut Area by Forest Type, District and Type of Cut.

Forest Type	:	Total	Districts											
			:	Bergland	:	Bessemer	:	Iron River	:	Kenton	:	Ontonagon	:	Watersmeet
<u>Regeneration Cuts - Acres</u>														
White Pine		80		10		-		40		20		10		-
Red Pine														
Jack Pine		30		-		-		-		20		10		-
Spruce-fir		790		30		120		350		170		60		60
Swamp Conifers		420		60		170		30		20		30		110
Aspen-Birch		<u>6,650</u>		<u>940</u>		<u>1,000</u>		<u>1,020</u>		<u>1,450</u>		<u>1,200</u>		<u>1,040</u>
Total		7,970		1,040		1,290		1,440		1,680		1,310		1,210
<u>Intermediate Cuts - Acres</u>														
White Pine		400		10		-		230		100		30		30
Red Pine		160		-		-		10		100		30		20
Jack Pine		150		-		-		10		50		30		60
Hemlock		1,540		40		140		90		570		410		290
Swamp Conifers		440		30		100		90		140		40		40
No. Hdws.		8,030		1,010		920		1,620		1,120		1,790		1,570
Low. Hdws.		<u>400</u>		<u>120</u>		<u>160</u>		<u>-</u>		<u>40</u>		<u>70</u>		<u>10</u>
Total		11,120		1,210		1,320		2,050		2,120		2,400		2,020
All Cuts		19,090		2,250		2,610		3,490		3,800		3,710		3,230

Table 12. Net Annual Allowable Cut Volume of Growing Stock ^{1/} by Species and District.

Species	: Total :	Districts					
		: Bergland :	: Bessemer :	: Iron River :	: Kenton :	: Ontonagon :	: Watersmeet :
		Cords					
Balsam Fir	12,380	930	1,920	2,870	2,200	1,860	2,600
W. & R. Pine	3,830	40		1,860	1,430	380	120
Hemlock	8,820	410	760	1,300	2,770	2,650	930
Jack Pine	1,410			30	1,000	270	110
Spruce	4,490	300	660	1,480	1,110	640	300
Cedar	6,870	900	1,690	600	1,210	1,870	600
Tamarack	<u>1,040</u>	<u>80</u>	<u> </u>	<u>400</u>	<u>290</u>	<u>80</u>	<u>190</u>
Softwoods	38,840	2,660	5,030	8,540	10,010	7,750	4,850
Aspen	67,670	8,000	10,260	10,920	14,000	13,570	10,920
Basswood	3,630	500	850	430	280	1,190	380
Yellow Birch	7,600	1,080	1,120	1,860	1,420	1,620	500
Sugar Maple	20,600	4,470	2,720	4,340	2,300	3,470	3,300
Red Maple	6,030	680	340	1,830	1,070	1,710	400
Ash	2,300	640	630	40	170	510	310
Elm	2,490	430	250	780	60	390	580
Paper Birch	5,030	190		2,370	1,670	550	250
Miscellaneous	<u>1,460</u>	<u>270</u>	<u>130</u>	<u>440</u>	<u>260</u>	<u>350</u>	<u>10</u>
Hardwoods	116,810	16,260	16,300	23,010	21,230	23,360	16,650
All Species	155,650	18,920	21,330	31,550	31,240	31,110	21,500

^{1/} Net volume of all merchantable trees 5.0" d.b.h. and larger to a variable top d.i.b. of not less than 4.0".

Table 13. Net Annual Allowable Cut Volume of Sawlog
Material^{1/} by Species and District. (MBM)

Species	Total	Districts					
		Bergland	Bessemer	Iron River	Kenton	Ontonagon	Watersmeet
W. & R. Pine	1,170	10	-	550	480	100	30
Hemlock	1,700	80	140	230	550	430	270
Basswood	380	50	160	20	-	70	80
Yellow Birch	1,070	220	150	220	140	230	110
Sugar Maple	3,920	800	510	740	450	760	660
Red Maple	620	80	50	130	90	200	70
Ash	410	110	140	-	20	90	50
Elm	350	50	50	120	10	40	80
Paper Birch	<u>100</u>	<u>-</u>	<u>-</u>	<u>80</u>	<u>20</u>	<u>-</u>	<u>-</u>
All Species	9,720	1,400	1,200	2,090	1,760	1,920	1,350

^{1/} Softwoods: 11.0" d.b.h. and larger to a variable top of not less than 8.0".
Hardwoods: 13.0" d.b.h. and larger to a variable top of not less than 9.0".

R9
Plan 13
c. 2.

UNIVERSITY OF MINNESOTA



3 1951 D02 973 768 1